Proposed Addition to Sections 8-2.30.2b

Reason for changes: Current AREMA Manual references ACI 318-02 to deal with the design of torsion. ACI 318-02 is a LRFD design manual that uses LRFD design reduction factors (\(\phi\)-factor) and load amplification factors in its group loading combinations. The last LFD design manual from ACI was ACI 318-99. Although the equations for calculating torsion behavior of a beam have not changed between the ACI 318-99 and the ACI 318-02 design manuals, the torsion \(\phi\)-factor and group loading combinations have changed from LFD to LRFD. Proposed addition to AREMA Section 8-2.30.2b is to add the LFD \(\phi\)-factor for torsion from ACI 318-99.

2.30.2 DESIGN STRENGTH (1992)

a. For reinforced concrete members designed with reference to load factors and strengths, the design strength provided by a member, its connections to other members, and its cross sections, in terms of flexure, axial load, shear and torsion shall be taken as the nominal strength calculated in accordance with the requirements and assumptions of LOAD FACTOR DESIGN, multiplied by a strength reduction factor \(\phi\).

b. Strength reduction factor \(\phi\) shall be taken as follows:

For flexure…………………………………………………………………………………………. \(\phi = 0.90\)
For shear and torsion……………………………………………………………………………… \(\phi = 0.85\)
For spirally reinforced compression members with or without flexure…………………………………………………………………..\(\phi = 0.75\)
For tied reinforced compression members with or without flexure……………………\(\phi = 0.70\)

NOTE: The value of \(\phi\) may be increased linearly from the value for compression members to the value for flexure as the axial load strength \(P_n\) decreases from \(P_b\) to zero.

For bearing on concrete ………………………………………………………………………..\(\phi = 0.70\)